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Fuscoporia valenzuelae (Hymenochaetaceae, Basidiomycota), a new species from the tropical dry forest in Mexico

Fuscoporia valenzuelae (Hymenochaetaceae, Basidiomycota), una especie nueva del bosque tropical caducifolio en México

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Abstract:

Background and Aims: The genus *Fuscoporia* is characterized by resupinate or pileate basidiomata, dimitic hyphal system, generative hyaline hyphae with encrusted crystals, setal hyphae, hymenial setae and subglobose, ellipsoid or (sub)cylindrical basidiospores. It has a cosmopolitan distribution and sixteen species have been registered from Mexico. The objective of this work was to describe and illustrate *Fuscoporia valenzuelae*, a new species from the tropical dry forest in Mexico.

Methods: The specimens were collected in tropical dry forest in the Chamela-Cuixmala and Sierra Álamos-Río Cuchujaqui Biosphere Reserves. Field data and morphological characteristics were recorded according to traditional techniques in mycology. The material was deposited in the herbarium ENCB of the Escuela Nacional de Ciencias Biológicas of the Instituto Politécnico Nacional.

Key results: The new species *Fuscoporia valenzuelae* was described. It is characterized by resupinate basidiomata of 1.5 m long, a hymenophore with angular to irregular pores (1-2 per mm), presence of hyphal and hymenial setae, and ellipsoid basidiospores. It grows on *Astronium graveolens*, causing white rot.

Conclusions: *Fuscoporia* with 17 species is the taxon best representing Hymenochaetaceae in Mexico. *Fuscoporia valenzuelae* is distributed in tropical dry forests of the Pacific Coast.

Key words: *Astronium graveolens*, *Fuscoporia contigua*, Hymenochaetales, Pacific Coast.

Resumen:

Antecedentes y Objetivos: El género *Fuscoporia* se caracteriza por basidiomas resupinados a pileados, sistema hifal dimítico con hifas generativas hialinas con cristales incrustados, setas hifales, setas himeniales, basidiosporas subglobosas, elipsoides o (sub)cilíndricas. Presenta distribución cosmopolita y en México se han registrado 16 especies. El objetivo de este trabajo es describir e ilustrar a *Fuscoporia valenzuelae* como especie nueva para el bosque tropical caducifolio en México.

Métodos: Los especímenes se recolectaron en el bosque tropical caducifolio de las Reservas de la Biosfera Chamela-Cuixmala y Sierra Álamos-Río Cuchujaqui. Se registraron los datos de campo y las características morfológicas de acuerdo con las técnicas tradicionales en la micología. Los especímenes se encuentran depositados en el herbario ENCB de la Escuela Nacional de Ciencias Biológicas del Instituto Politécnico Nacional.

Resultados clave: Se describe a *Fuscoporia valenzuelae*, una especie nueva que se caracteriza por basidiomas resupinados grandes de hasta 1.5 m de longitud, himenóforo con poros angulares a irregulares de 1-2 por mm, setas hifales y setas himeniales presentes; basidiosporas elipsoides. Crece sobre *Astronium graveolens*, causando pudrición blanca.

Conclusiones: *Fuscoporia* con 17 especies es el taxón mejor representado de Hymenochaetaceae en México. *Fuscoporia valenzuelae* se distribuye en el bosque tropical caducifolio de la Planicie Costera del Pacífico.

Palabras clave: *Astronium graveolens*, *Fuscoporia contigua*, Hymenochaetales, Planicie Costera del Pacífico.

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Introduction

The genus *Fuscoporia* was described by Murrill (1907) with the type species *F. ferruginosa* (Schrad.) Murrill. This genus belongs to the family Hymenochaetaceae, order Polyporales, class Agaricomycetes of the phylum Basidiomycota. It is characterized by the formation of annual or perennial basidiomata, resupinate or pileate, monomitic or dimitic hyphal system, abundant hymenial setae, generative hyphae with encrusted crystals and hyaline basidiospores, that are allantoid, subglobose, ovoid, ellipsoid, subcylindrical to cylindrical, thin and smooth walled; it has a cosmopolitan distribution (Wagner and Fischer, 2001; Groposo et al., 2007; Baltazar et al., 2009; Baltazar and Gibertoni, 2010; Raymundo et al., 2013a, b; Chen and Yuan, 2017; Chen et al., 2019, 2020). Fifty species belonging to this genus have been described in the world according to Chen et al. (2020). In Mexico, 16 species have been cited (Index Fungorum, 2021): *F. callimorpha* (Lév) Groposo, Log.-Leite & Góes-Neto, *F. contigua* (Pers.) G. Cunn., *F. chrysea* (Lév.) Baltazar & Gibertoni, *F. contiguiformis* (Pilát) Raymundo, R. Valenz. & Esqueda,

F. coronadensis (Rizzo, Gieser & Burds.) Raymundo, R. Valenz. & Cifuentes, *F. ferrea* (Pers.) G. Cunn., *F. ferruginosa*, *F. gilva* (Schwein.) T. Wagner & M. Fisch., *F. latispota* Y.C. Dai, Q. Chen & J. Vlasák, *F. mesophila* Raymundo, R. Valenz. & Pacheco, *F. nicaraguensis* Murrill, *F. palmicola* (Berk. & M.A. Curtis) Bondartseva & S. Herrera, *F. rhabarbarina* (Berk.) Groposo, Log.-Leite & Góes-Neto, *F. viticola* (Schwein.) Murrill, *F. wahlbergii* (Fr.) T. Wagner & M. Fisch., *F. xerophila* Raymundo, R. Valenz. & Esqueda. The objective of this work is to describe and illustrate *Fuscoporia valenzuelae*, a new species from the tropical dry forests in Mexico.

Materials and Methods

The Chamela-Cuixmala Biosphere Reserve was surveyed during two sampling trips in September 2010 and 2011, in the locality Búho (19°29'58.39"N, 105°02'37.97"W, 124 m a.s.l.). The Sierra de Álamos-Río Cuchujaqui Biosphere Reserve was surveyed during two collection trips in October 2013 and 2014, in the locality Rancho La Sierrita (26°58'25"N, 108°56'42"W, 528 m a.s.l.) (Fig. 1). The col-

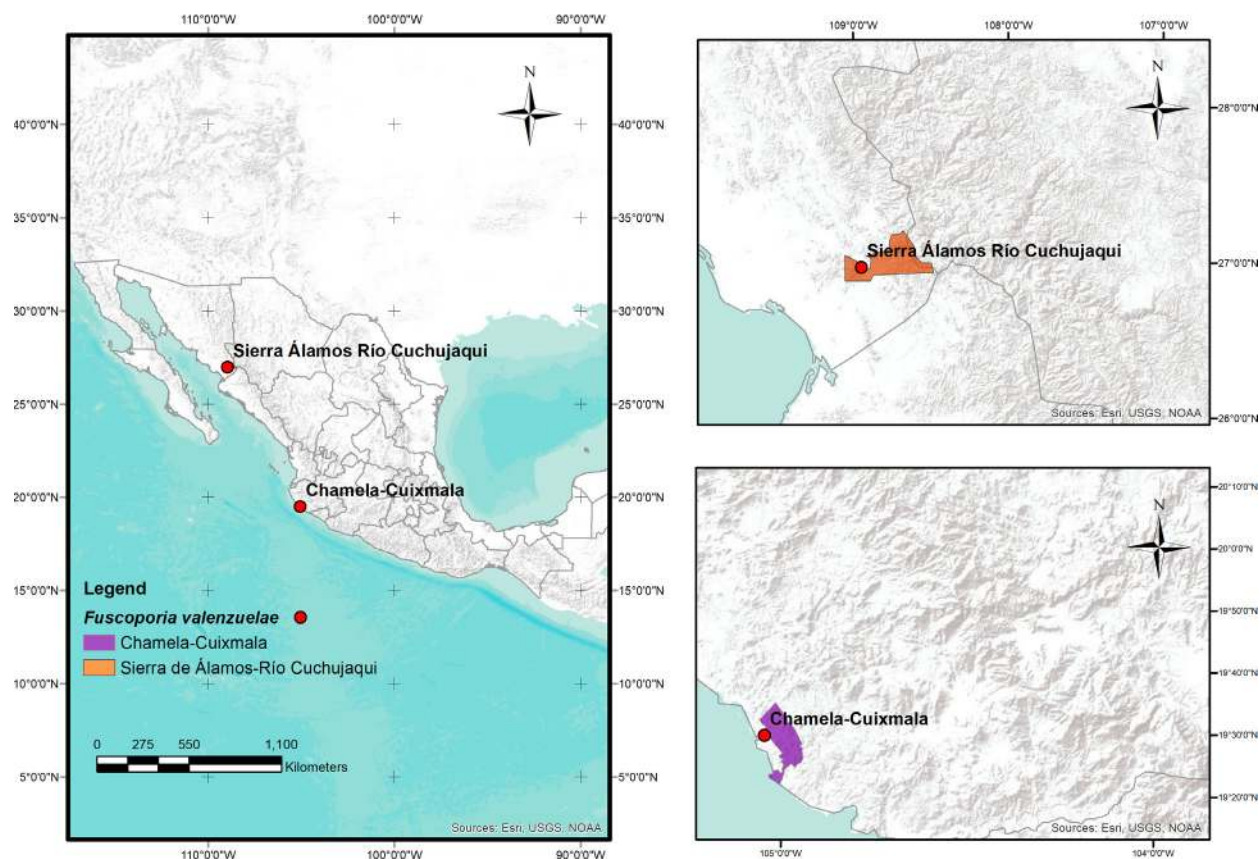


Figure 1: Map of known localities of *Fuscoporia valenzuelae* Raymundo in Mexico.

lected specimens were described from fresh material, processed and deposited in the herbarium ENCB, Escuela Nacional de Ciencias Biológicas, Instituto Politécnico Nacional, Mexico City, Mexico. The species were determined by observing transversal and longitudinal sections of the basidiomata in temporary preparations mounted in 70% alcohol, 10% KOH, and colors coded according to [Kornerup and Wanscher \(1978\)](#). Morphological examinations were conducted using protocols outlined by [Raymundo et al. \(2013a,b\)](#) and [Ryvarden \(2004\)](#). Anatomical characteristics were measured from rehydrated tissues in 5% aqueous KOH and Melzer's reagent. Line drawings were made to scale using an optical light microscopy (K-7 Zeiss, Jena, Germany) with clear camera, and macroscopic photographs were taken with a Nikon Coolpix 4300. The meaning of all terms is based on [Ulloa and Hanlin \(2012\)](#).

Results

We here present a dichotomous identification key of the Mexican *Fuscoporia* species modified from [Raymundo et al. \(2013a,b\)](#).

Key to *Fuscoporia* species in Mexico

- 1a. Hyphal setae present in trama, margin, and/or subiculum 2
- 1b. Hyphal setae absent 6
- 2a. Basidiospores globose to subglobose, basidiomata resupinate 3
- 2b. Basidiospores ellipsoid, broadly ellipsoid, oblong to cylindrical, basidiomata resupinate to pileate 4
- 3a. Pores 7-9 per mm, hymenial setae 24-36 $\mu\text{m} \times 6.4-9.2 \mu\text{m}$, subulate, straight and hyphal setae on the sterile margin 60-136 $\mu\text{m} \times 6-12 \mu\text{m}$, basidiospores 2.4-4.4 μm , globose *F. nicaraguensis* Murrill
- 3b. Pores 4-5 per mm, hymenial setae 48-52 $\mu\text{m} \times 6.4-8 \mu\text{m}$, ventricose to ventricose-rostrate, straight; hyphal setae on the margin or subiculum 88-180 $\mu\text{m} \times 12-20 \mu\text{m}$, straight, lanceolate to lageniform; basidiospores 5.12-5.46 $\mu\text{m} \times 4-4.48 \mu\text{m}$, subglobose *F. xerophila* Raymundo, R. Valenz. & Esqueda
- 4a. Pores 1-5 per mm 5
- 4b. Pores 7-9 per mm, hymenial setae 30-60 $\mu\text{m} \times 6-10 \mu\text{m}$, subulate, straight and hyphal setae on the sterile margin 90-150 $\mu\text{m} \times 6-10 \mu\text{m}$, basidiospores 5-7 $\mu\text{m} \times 2.4-3.5 \mu\text{m}$, cylindrical *F. ferruginosa* (Schrad.) Murrill
- 5a. Basidiospores ellipsoid; hymenial setae <40 μm ; hyphal setae up to 80 μm ; pores 1-2 per mm, growing on *Astronium graveolens* Jacq. *F. valenzuelae* Raymundo
- 5b. Basidiospores oblong to subcylindrical; hymenial setae >40 μm ; hyphal setae up to 80 μm ; pores 2-5 per mm; growing on several hosts 6
- 6a. Hymenial setae 40-60 $\mu\text{m} \times 6-8 \mu\text{m}$, subulate, straight, tramal setae 50-90 $\mu\text{m} \times 5-12 \mu\text{m}$, subulate, straight and hyphal setae on the floccose margin up to 120 μm long, basidiospores 5-7 $\mu\text{m} \times 2.4-3.5 \mu\text{m}$, subcylindrical to oblong *F. contigua* (Pers.) G. Cunn.
- 6b. Hymenial setae 55-72 $\mu\text{m} \times 6-9 \mu\text{m}$, straight, tramal setae absent, straight and hyphal setae on the tomentose margin up to 110 μm long, basidiospores 4-5 $\mu\text{m} \times 2.8-3.5 \mu\text{m}$, oblong *F. latispora* Y.C. Dai, Q. Chen & J. Vlasák
- 7a. Basidiomata resupinate to effused-reflexed 8
- 7b. Basidiomata pileate-sessile 11
- 8a. Pores 1-3 per mm 9
- 8b. Pores 4-6 per mm 10
- 9a. Basidiospores oblong to cylindrical, 4-5 $\mu\text{m} \times 2-2.5 \mu\text{m}$, pores angular, sinuous to labyrinthiform, hymenial setae 32-64 $\mu\text{m} \times 6.4-7.2 \mu\text{m}$, subulate *F. palmicola* (Berk. & M.A. Curtis) Bondartseva & S. Herrera
- 9b. Basidiospores cylindrical to slightly curved, 7-8 $\mu\text{m} \times 1.6-2 \mu\text{m}$, pores angular, hymenial setae 50-70 $\mu\text{m} \times 5-7 \mu\text{m}$, subulate *F. contiguiiformis* (Pilát) Raymundo, R. Valenz. & Esqueda
- 10a. Basidiospores broadly ellipsoid to subglobose, 3.2-4 $\mu\text{m} \times 2.4-3 \mu\text{m}$, hymenial setae 30-50 $\mu\text{m} \times 5-8 \mu\text{m}$, ventricose to subulate *F. chrysea* (Lév.) Baltazar & Gibertoni
- 10b. Basidiospores cylindrical, 5.5-7.6 $\mu\text{m} \times 2.4-3.2 \mu\text{m}$, hymenial setae 27-37 $\mu\text{m} \times 5-7 \mu\text{m}$, subulate *F. ferrea* (Pers.) G. Cunn.

- 11a. Basidiospores cylindrical to slightly curved, 7-9 $\mu\text{m} \times$ 1.5-2 μm , hymenial setae 25-75 $\mu\text{m} \times$ 5-8 μm , subulate *F. viticola* (Schwein.) Murrill
- 11b. Basidiospores globose to subcylindrical, never curved, >2 μm in diameter 12
- 12a. Hymenial setae hooked, some straight, 25-44 $\mu\text{m} \times$ 8-13.2 μm , basidiospores subglobose to ellipsoid, basidiomata applanate, dimidiate to broadly attached, pores 6-8 per mm, circular to elongate *F. wahlbergii* (Fr.) T. Wagner & M. Fisch.
- 12b. Hymenial setae straight 13
- 13a. Basidiomata large, 100-350 mm $\times$ 150-300 mm $\times$ 25-100 mm, applanate, dimidiate to broadly attached, pores (5-)6-7(-8) per mm, circular, hymenial setae 20-32 $\mu\text{m} \times$ 6.4-9 μm , ventricose to subulate, basidiospores 3.2-5.6(-6) $\mu\text{m} \times$ 3.2-4 μm , subglobose to ovoid, growing only on conifers *F. coronadensis* (Rizzo, Gieser & Burds.) Raymundo, R. Valenz. & Cifuentes
- 13b. Basidiomata small to medium size, growing only on angiosperms 14
- 14a. Pileus surface with a distinctive black crust, glabrous and sulcate, pores 6-9 per mm, hymenial setae 20-30 $\mu\text{m} \times$ 4.8-7.2 μm , subulate, basidiospores 3.2-4 $\mu\text{m} \times$ 2-3 μm , ellipsoid *F. rhabarbarina* (Berk.) Groposo, Log.-Leite & Góes-Neto
- 14b. Pileus surface without a distinctive black crust 15
- 15a. Basidiomata triquetrous to ungulate, pileus surface velutinate to tomentose, concentrically sulcate, pores 6-8 per mm, circular, hymenial setae 28-40 $\mu\text{m} \times$ 8.8-16 μm , ventricose, basidiospores 4.0 $\mu\text{m} \times$ 3.2-3.8 μm , subglobose to ovoid *F. mesophila* Raymundo, R. Valenz. & Pacheco
- 15b. Basidiomata applanate to convex, hymenial setae <10 μm broad 16
- 16a. Hymenial setae 16-28 $\mu\text{m} \times$ 6-8.8 μm , subulate to ventricose, basidiospores 3.6-4.8 $\mu\text{m} \times$ 2-3 μm , oblong to subcylindrical *F. callimorpha* (Lév) Groposo, Log.-Leite & Góes-Neto
- 16b. Hymenial setae 20-40 $\mu\text{m} \times$ 6-10.2 μm , ventricose to subulate, basidiospores 4-5 $\mu\text{m} \times$ 2.5-3 μm , narrowly ellipsoid to oblong *F. gilva* (Schwein.) T. Wagner & M. Fisch.

Taxonomy

Basidiomycota

Agaricomycetes

Hymenochaetales

Hymenochaetaceae

***Fuscoporia valenzuelae* Raymundo, sp. nov. Figs. 2,3,4,5.**

TYPE: MEXICO. Jalisco, municipality La Huerta, Reserva de la Biosfera Chamela-Cuixmala, Búho, 124 m, 19°29'58.39"N, 105°02'37.97"W, 27.IX.2010, *T. Raymundo* 3475 (holotype: ENCB); Mycobank: MB839199.

Fuscoporia valenzuelae differs from *Fuscoporia contigua* by its smaller pores, its shorter and ellipsoid basidiospores and its hymenial setae and hyphal setae of small size. It lacks tramal setae and grows on *Astronium graveolens* in tropical dry forest.

Basidiomata annual, 100-150 $\times$ 20-40 $\times$ 0.1-0.3 cm, resupinate, adnate, becoming widely effused, corky to woody, easily separable of the substrate; margin sterile, golden brown (5A3), yellowish brown (5A4), matted; hymenophore poroid, honey (6D7) to red brown (6E6), cracked with age in dry specimens, grayish brown (6D5) to golden brown (6D6) in old specimens; pores angular to irregular, 1-2 per mm, 200-400 $\times$ 160-180 μm ; dissepiments thin to thick and lacerated, 50-100 μm thick; tubes 1 mm deep, one layer, tough to woody, grayish brown (6E3) to brown (5E8); context or subiculum very thin, 1-3 mm thick, pale yellow (5A3); hyphal system dimitic, generative hyphae simple septa, hyaline to pale yellow in KOH, thin-walled, 2-3.4 μm diameter; skeletal hyphae yellowish brown to reddish brown, unbranched or rarely branched, thick-walled, 3.2-4.8 μm diameter; hymenophoral trama 50-60 μm thick, composed by interwoven hyphae, generative hyphae hyaline to pale yellow in KOH, thin-walled, simple to slightly branched, 2.4-3.2 μm diameter, hyphae projecting beyond the hymenia and on the edge of dissepiments.

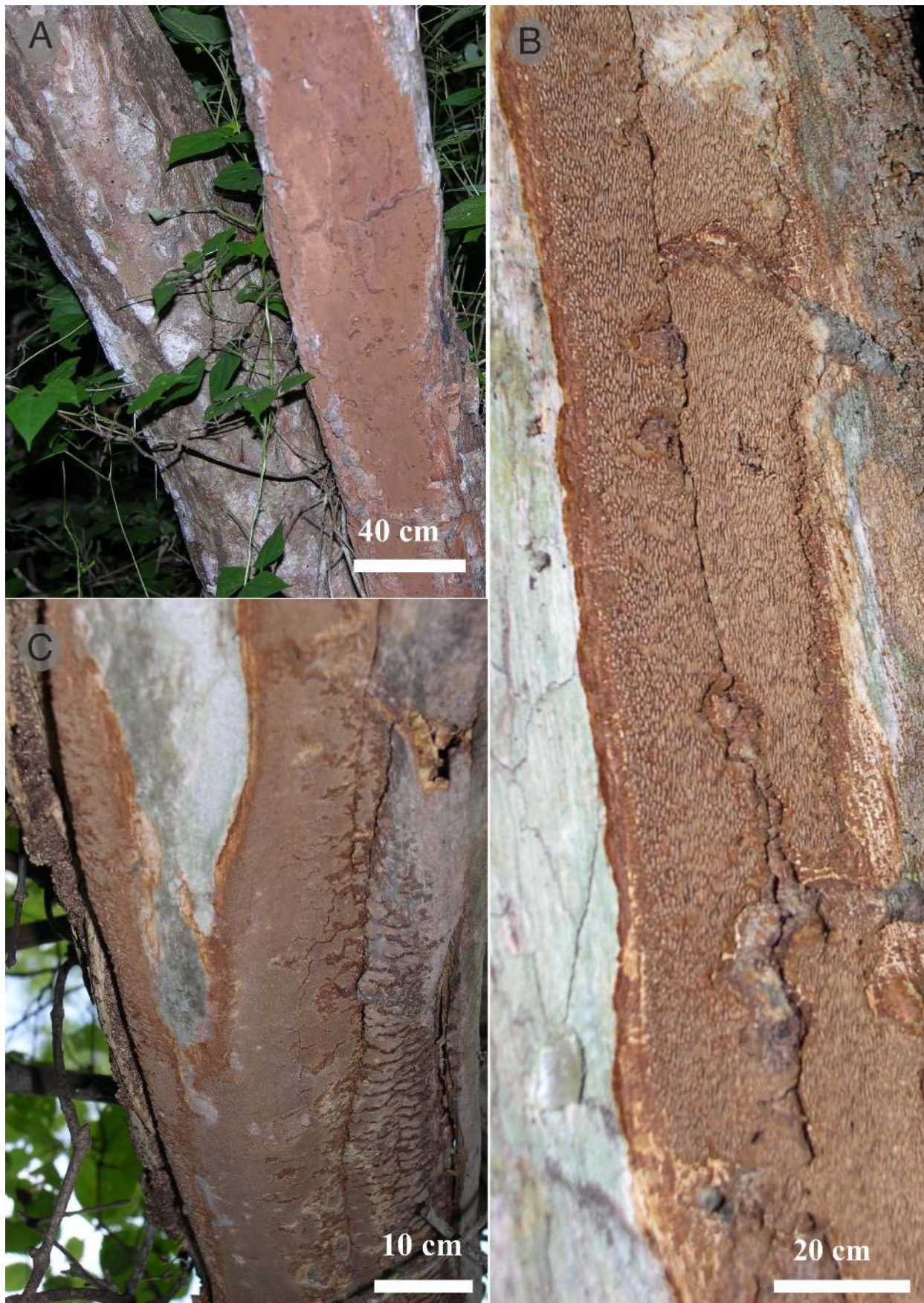


Figure 2: *Fuscoporia valenzuelae* Raymundo. A. basidiomata growing on *Astronium graveolens* Jacq. in the Chamela-Cuixmala Biosphere Reserve, Jalisco, Mexico; B-C. basidiomata growing on *Astronium graveolens* Jacq. in the Sierra Álamos-Río Cuchujaqui Biosphere Reserve, Sonora, Mexico.

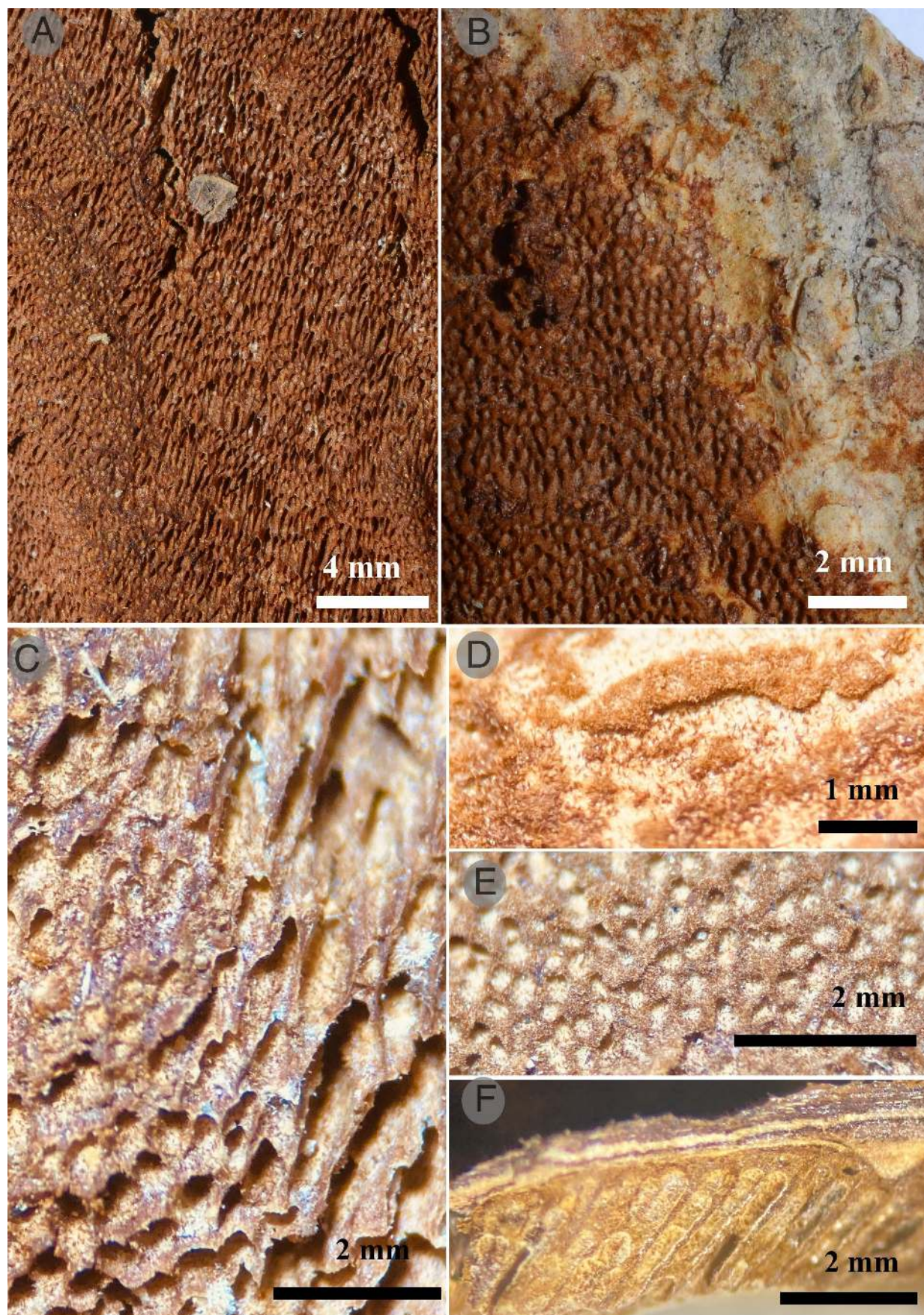


Figure 3: *Fuscoporia valenzuelae* Raymundo. A. hymenophore; B. margin; C. pores; D. close up margin; E. close up pores and dissepiment; F. tubes and subiculum.

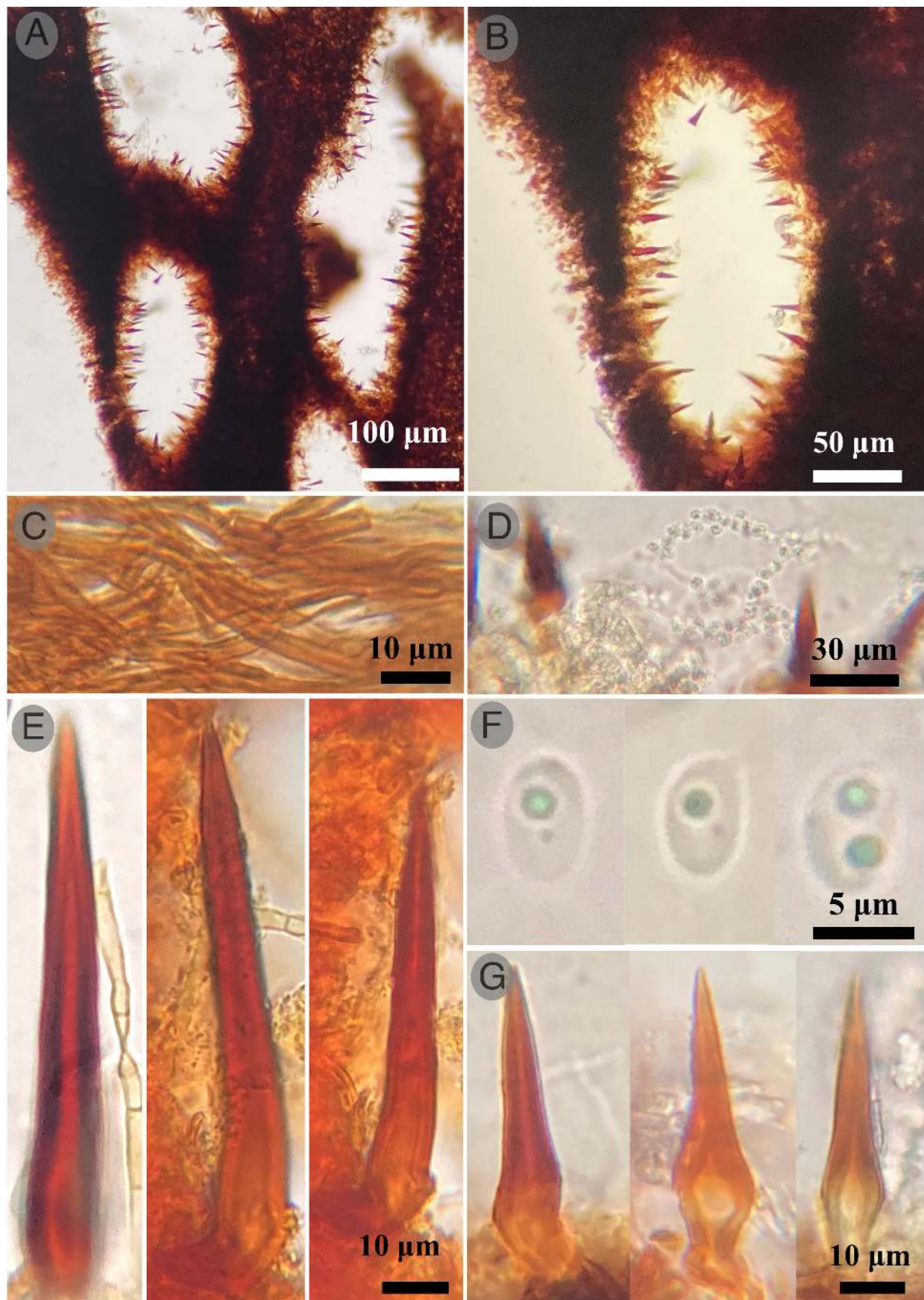


Figure 4: *Fuscoporia valenzuelae* Raymundo. A. hymenophore; B. pore and dissepiment; C. hyphal system; D. generative hyphae encrusted with crystals; E. hyphal setae; F. basidiospores; G. hymenial setae.

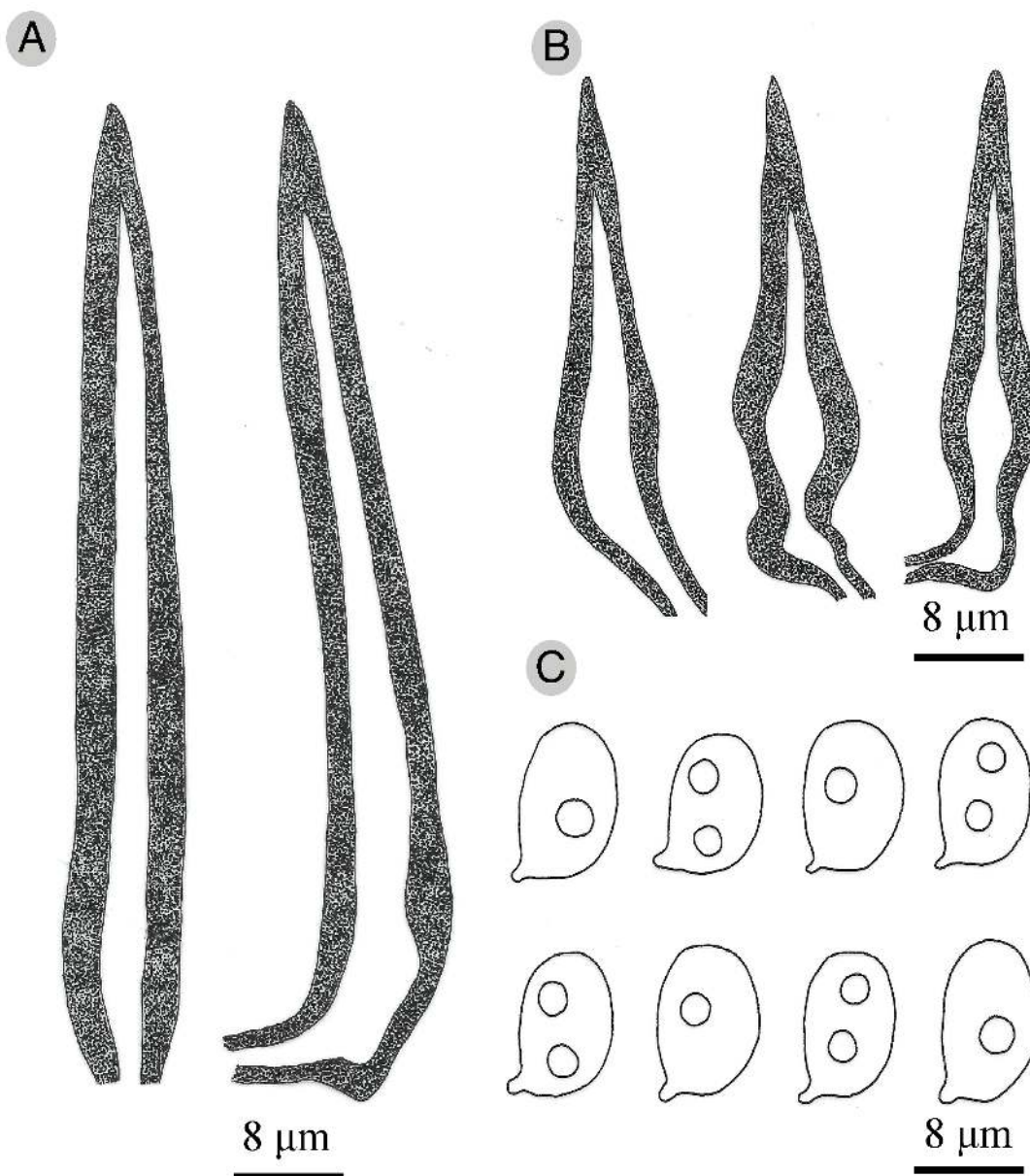


Figure 5: *Fuscoporia valenzuelae* Raymundo. A. hyphal setae; B. hymenial setae; C. basidiospores.

ments strongly encrusted with crystals; skeletal hyphae yellowish brown to reddish brown in KOH, unbranched, thick-walled, 3.2-4 μm diameter; contextual trama with interwoven hyphae, generative hyphae rare, hyaline to pale yellow in KOH, simple to scarcely branched, thick-walled, 1.6-2.4 μm diameter; skeletal hyphae dominant, reddish brown in KOH, unbranched, thick-walled, 2.4-4.8 μm diameter; hyphal setae 64-80 $\times$ 6-14 μm , straight, lanceolate to lageniform, acute, dark brown in KOH, thick-walled, only

found in subiculum and margin; hymenial setae 33-40 $\times$ 6-9 μm , ventricose to subulate, acute, reddish brown to dark brown in KOH, thick-walled; cystidioles hyaline, lageniform; basidia not observed; basidiospores 4.5-5 μm $\times$ 3-3.5 μm , ellipsoid, hyaline, thin-walled, smooth and with guttation.

Habit and habitat: growing on living trees of *Astronium graveolens* (Anacardiaceae), causing white rot, in tropical dry forest, at 40-220 m a.s.l.

Etymology: the epithet honors Dr. Ricardo Valenzuela, specialist in the family Hymenochaetaceae.

Additional material examined: MEXICO. Jalisco, municipality La Huerta, Chamela-Cuixmala Biosphere Reserve, Búho, 124 m, 19°29'58.39"N, 105°02'37.97"W, 17.IX.2011. *T. Raymundo* 3996 (ENCB). Sonora, municipality Álamos, Sierra Álamos-Río Cuchujaqui Biosphere Reserve, La Sierrita, 528 m, 26°58'25"N, 108°56'42"W, 16.X.2013. *T. Raymundo* 4873 (ENCB); loc. cit., 8.X.2014. *T. Raymundo* 5473 (ENCB).

Taxonomic notes: this species is characterized by resupinate, very long basidiomata, up to 150 cm long, growing on living trees, pores 1-2 per mm; hyphal and hymenial setae present, basidiospores ellipsoid. *Fuscoporia contigua* resembles this species, with resupinate basidiomata; however, these are 5-10 cm long with 2-3 pores per mm. Moreover, it differs by hymenial setae of 40-60 × 6-8 µm, hyphal setae of 80-120 × 6-12 µm and it produces basidiospores that are oblong-ellipsoid (5-7 × 2.4-3.5 µm). This species develop tramal setae of up to 90 µm long. *Fuscoporia ferruginosa* differs by the presence of more pores per mm (7-9) and cylindrical spores; *F. chrysea* can be distinguished by the golden yellow margin of basidiomata and ellipsoid spores.

Conclusions

The genus *Fuscoporia* with 17 species is the best represented taxon of Hymenochaetaceae in Mexico, which is the country with the highest number of registered species. One of the species with the greatest morphological variability has been *F. contigua* which was considered a complex by Chen et al. (2019). However, they indicated that this species has a wide distribution in the northern hemisphere, and demonstrated that various specimens from China, Costa Rica, Mexico, and the United States of America turned out to be new species. From this study, *Fuscoporia latispora* was described for Mexico from the state of Veracruz. Therefore, it is very likely that various specimens from the Neotropical region that are found under the epithet of *F. contigua* will have to be reviewed in detail. In this case, *F. valenzuelae* is

a species that is distributed in the tropical dry forest of the Mexican Pacific Coast Plain which will probably be linked to the distribution of its host.

Author contribution

TR collected the specimens, conceived, wrote and illustrated the manuscript

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